

# **EXERCISE DEVICE**

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## **BACKGROUND OF THE INVENTION**

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### **Field of the Invention**

This invention relates to weight lifting machines and devices, more particularly to a self-spotting weight lifting machine where the weightlifter can lift weights until weary and be able to release the weights without dropping them.

### **Description of the Related Art**

Weightlifting is well known in the art, and is a recognized Olympic sport. Additionally, weightlifting provides muscular development especially for the upper body and long muscles of the legs. Weightlifting gyms have become very popular places for activity and socializing as physical exercise generally forms a portion of most persons' days.

When lifting weights, much of the muscle development occurs once the muscles have been warmed up, and become weary from the weightlifting activity. This is particularly true for bodybuilders who lift small weights a great number of times in order to achieve better definition of particular muscle groups. Power lifters generally focus upon the amount of weight that they can lift, and also engage in "repetitions" where a weight of a certain amount is lifted a number of times repeatedly.

In most of these activities, barbells or dumbbells are used. Because the weightlifting activity generally brings the weightlifter to the limit of his or her endurance, it is common to have a second person, called a "spotter," to help the person at the end of the repeated lifting



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# **UTILITY APPLICATION**

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**DARRELL GREENLAND**

**FOR**

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**ON**

**EXERCISE DEVICE**

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cycle where the weightlifter's endurance begins to fail. The spotter is there to help the weightlifter lift the weight back onto a weight stand (that holds the weight) should the weightlifter be unable to return the weight to the stand. This is an important safety function, as the weight could either drop to the floor or the weightlifter, possibly injuring the weightlifter. The possibility of the latter case can arise when the weightlifter is reclined on a bench and lifting a barbell upwardly in a manner that, due to the weightlifter's reclining position, is directly over the weightlifter. When the weightlifter cannot return the weight to the stand, the barbell then descends by gravity onto the weightlifter. This can be particularly difficult if the barbell should engage the weightlifter's throat or windpipe. Generally, the weightlifter in distress would then turn the barbell to allow it to drop to the floor. However, this is a situation to be avoided, as it shows a lack of control and may injure the equipment as well as third persons.

Consequently, it is a shortcoming present in the art as there are a few, if any, exercise machines or exercise devices that allow the weightlifter to operate on his or her own without demanding the attention and time of a spotter.

There have been previous attempts made in the art with respect to self-spotting weightlifting devices.

U.S. Patent No. 4,973,050 issued to Santoro on November 27, 1990 for a Pulleyless Weightlifting Apparatus is directed to an apparatus for facilitating free weight exercises so as to prevent injury using barbells or dumbbells. The exercise apparatus 10 has a pair of bases 60, 62 supporting posts 34, 37 containing counterweights 72, 75 that are connected to cables 44, 47 that have connectors at the opposite end for connecting a barbell or dumbbells. The posts have a plurality of apertures for receiving stop pins 8 to limit the travel of the

counterweights and also receive hooks 5 for supporting the barbell at a selected location. The weight lifting apparatus allows unrestricted movement of the weight bar or dumbbells, but provides safety to the user, but in a manner differing structurally from the present invention.

U.S. Patent No. 5,407,403 issued to Coleman on April 18, 1995 for a Forcer Repetition Assist Device is directed to a mechanical weight lifting partner that can be programmed for operational parameters to allow predetermined weight lifting performance with the training partner being transparent to the user unless parameters are exceeded and assistance is necessary. The apparatus 1 has a vertical unit 92 that contains a control unit 58 containing a microprocessor-based control unit 58 that controls a motor controller that is coupled to a system containing a motor 56, clutch 52, encoder 35, as well as a roller chain drive with sprockets and a cable system. The apparatus is programmed through a keypad 72 so that with a barbell 2 or dumbbells 6, 12 connected to cable 22, exercises can be performed without the apparatus being involved unless the encoder determines that rates are being exceeded, then clutch is engaged and assistance is provided to the weight lifter.

U.S. Patent No. 5,788,616 issued to Polidi on August 4, 1998 for a Mechanical Weightlifting Machine is directed to a mechanical weight lifting machine that serves as a human spotter. The mechanical spotter 10 has a support frame 18 with a vertical support structure 25. An articulating mechanism 32 is provided that can selectively be used with dumbbells or a barbell. The articulating unit has a counterweight 44 that can be adjusted to balance out the weight of the machine so no resistance is felt by the user in raising or lowering free weights, if desired. Drive motor 60 and a foot control 58 are provided for weight adjustment. Rods 40 are suspended from the articulating unit with lower ends 42 that can be connected to a dumbbell or barbell. The downward swing of the weights are limited by stops

72 and the support frame includes a pair of weight rests 74. The disclosed structure does not allow for pivotal displacement in the horizontal plane.

U.S. Patent No. 5,971,897 issued to Olson et al. on October 26, 1999 for a Multi-Purpose, Natural-Motion Exercise Machine is directed to a multipurpose natural motion exercise machine permitting safe free-ranging motion. The machine has handlebars 26 that are supported on a bearing sleeve 20 that rides on horizontal shaft 16. Shaft 16 is coupled to main bearing sleeve 14 that rides on main shaft 12. Vertical bearing sleeve 14 has a weight bar 30 upon which a desired amount of weights are placed. A safety catch 38 is placed on the vertical shaft to limit the downward motion of the handles and a safety catch 36 is installed on the horizontal shaft 16. The user can provide repetitions of weight lifting using natural elliptical motions provided by bearing slides.

U.S. Patent No. 4,998,723 issued to Santoro on March 12, 1991 for a Cable Suspended Dumbbell [sic] and Barbell Weightlifting Apparatus is directed to a cable suspended dumbbell and barbell weightlifting apparatus that provides safety to the user. The exercise apparatus 10 can support dumbbells 54 or a barbell 80 on the end of the two cables 58 that can be adjusted to a pre-selected height by positioning slider assemblies 44, 46 on guide track support members 40 and inserting key stops 32 through holes 60 in the guide track.

It can be seen that the art would be advanced by a self-spotting exercise device that would allow weightlifters to lift weights without risking injury or dropping the weights, as well as requiring the services of a spotter. This would further allow individuals to exercise with weights independently of others, as well as providing a safe means by which to do so.

## SUMMARY OF THE INVENTION

The present invention uses a horizontal supporting member upon which free weight connecting members rest when not in use. Free weights, such as dumbbells or barbells, can be attached to the free weight connecting members which are then supported by the horizontal supporting member. In so doing, the present invention generally provides a support structure for free weights that includes a pair of omnidirectional arms adapted to support or mount weights thereon. Consequently, while the present invention provides support and self-spotting for free weights, minimal restriction is placed upon the range of motion of such free weights.

To provide retrofittable attachment to current exercise devices or the like, a vertical attachment member generally provides support for both the horizontal supporting member as well as horizontally and vertically extending members that serve to space the free weight connecting members apart.

The horizontal extending members extend horizontally rearwardly from the vertical attachment member at an angle. The vertical coupling members are then attached to the horizontally extending member in a pivotable fashion. The free weight connecting members are then pivotably attached to the vertical coupling members. Forward motion of the free weight connecting members is inhibited by a stop that prevents the pivoting motion of the vertical coupling members. Without such stops, the vertical coupling members could allow the free weight connecting member to pivot downwardly, dropping the weight toward the floor.

The vertical attachment member can then be attached to an existing exercise machine, may be used separately with a vertical support of one kind or another, or may be retrofitted to weight stands or the like. In an alternative embodiment, the horizontal supporting member may have vertical posts that substitute for the vertical attachment members attachment to a

vertical support. The vertical support is then delivered by the vertical posts attached to the horizontal supporting member with operation much the same as with the other embodiments.

Additionally, a barbell or other weight clamp is disclosed that allows secure engagement of a barbell for use in the present invention or otherwise.

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## **OBJECTS OF THE INVENTION**

It is an object of the present invention to provide an exercise device that allows weights to be supported when not subject to a weightlifter's activities.

It is another object of the present invention to provide a self-spotting exercise device that allows a weightlifter to support weights after a cycle of weightlifting activity.

It is another object of the present invention to provide a self-spotting exercise device that enables free weights to have unrestricted movement while attached to arms.

It is yet another object of the present invention to provide a self-spotting weightlifting device that allows a weightlifter to engage or disengage weights in a safe and controlled manner without the use of a human spotter.

It is yet another object of the present invention to provide an exercise device that is retrofittable to currently-existing exercise devices.

It is yet another object of the present invention to provide a self-spotting exercise weightlifting exercise machine that is easily used and manufactured.

It is yet another object of the present invention to provide a weightlifting system for a weightlifter that replicates free-range or unrestricted movement and a natural range of motion including a generally omni-directional manner in a self-spotting weightlifting system.

These and other objects and advantages of the present invention will be apparent from a review of the following specification and accompanying drawings.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

5 Figure 1 is a right upper perspective view of a weightlifting system incorporating the present invention showing the weightlifter lifting dumbbells.

Figure 1A is an enlarged partially phantom and exploded view of the pin-based attachment system used in the present invention as shown in circle 1A of Figure 1.

10 Figure 2 is a right upper perspective view of the exercise device of the present invention shown in Figure 1 showing the weightlifter in a standing position.

Figure 3 is a right upper perspective view of a present invention with the vertical attachment member having an open back end and a vertical support beam shown in phantom.

15 Figure 4 shows an alternative embodiment of the exercise device shown in Figure 3 with the vertical support shown in phantom, and weight posts shown on the free weight connecting members near the weights' supports.

20 Figure 5 shows an upper right perspective view of the exercise device of the present invention with the free weight connecting member shown resting on the horizontal supporting member.

Figure 6 shows an upper right perspective view of an upper right perspective view of the exercise device of Figure 5 with the free weight connecting members pivoted above the horizontal supporting member.



Figure 7 shows an upper right perspective view of the exercise device of the present invention used in conjunction with an existing weightlifting system with a counterweight provided by a bar for exercising the latissimus dorsi muscles, known as a "lat bar."

Figure 8 shows an upper right perspective view of the exercise system of Figure 7 with the weightlifter shown in a standing position.

Figure 9 shows an upper perspective view of a weightlifting bench retrofitted to incorporate the present invention.

Figure 10 is an upper right perspective view of a free weight clamp according to the present invention.

Figure 11 shows an upper right perspective view of a weightlifting bench incorporating the present invention where the horizontal supporting member is coupled to a pair of spaced-apart upstanding posts.

Figure 12 shows an upper right perspective view of a weightlifting bench incorporating the present invention where the vertical supporting members are independently arranged and aligned with similarly independent horizontal supporting members.

## DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

The detailed description set forth below in connection with the appended drawings is intended as a description of presently-preferred embodiments of the invention and is not intended to represent the only forms in which the present invention may be constructed and/or utilized. The description sets forth the functions and the sequence of steps for constructing and operating the invention in connection with the illustrated embodiments. However, it is to be understood that the same or equivalent functions and sequences may be accomplished by

different embodiments that are also intended to be encompassed within the spirit and scope of the invention.

The exercise device 100, or self-spotting exercise attachment 100, enables the weightlifter W to lift weights safely and controllably without the use of a human spotter. To do so, a horizontal supporting member 102 which may have upstanding flanges or retainers 104 is connected to a vertical attachment member 106. The attachment between the horizontal supporting member 102 and the vertical attachment member 106 may be as by welding, precast molding, or the like. Extending rearwardly on either side of the vertical attachment member 106 are horizontal extending members 108 which extend rearwardly and away from the weightlifter W at an angle from the vertical attachment member 106. The angle and length of the horizontal extending member 108 is discussed in more detail below with respect to the proper support of the weights.

Pivotably attached to the horizontal extending member 108 is a vertical coupling member 110. The vertical coupling member 110 is coupled in a pivotable fashion to the horizontal extending member 108. In one embodiment, the vertical coupling member 110 may be pivotably coupled to the horizontal extending member 108 at approximately its center 112. The pivoting motion of the vertical coupling member 110 may be obstructed by a stop 120 or the like. The stop 120 prevents the forward travel of the lower end of the vertical coupling member 110. As seen in Figure 1, the vertical coupling member 110 on the viewer's left is prevented from traveling in a counter-clockwise direction. Correspondingly, for the viewer to view the other vertical coupling member 110 from the other side of the exercise device 100, the vertical coupling member 110 would be obstructed by the stop 120 from traveling in a clockwise direction. A counterweight 114 may sit atop the vertical coupling member 110 and,

at least to a certain degree, balance the free weight connecting members 126 and the moments, or torques, arising via the vertical coupling member 110 about the center pivot 112.

At the lower end 122 of the vertical coupling member 110 is a pivotable connection 124 made between the vertical coupling member 110 and the free weight connecting member 126.

The pivotable connection 124 may operate in a generally vertical manner, much like a hinge. For additional flexibility and articulation, the pivotable connection 124 may be a ball joint, or Heim joint, which also allows for some rotation about the pivotable connection 124. Additionally, other alternative joints or pivotable connections may be used to good advantage in the present invention so long as they provide the proper operability necessary for the present invention 100. Use of ball, or Heim, joints may allow for a greater range of motion that replicates a free range of motion and promotes generally unrestricted movement to provide a natural range of motion.

The free weight connecting member 126 extends forwardly towards the weightlifter W from the pivotable connection 124 with the vertical coupling member 110. Generally, the free weight connecting member 126 extends forwardly for the horizontal supporting member 102 to provide easy engagement of the weights 130 by the weightlifter W.

The free weight connecting member 126 enjoys a vertically pivoting connection 124 with the vertical coupling member 110. At the opposite end 132 of the free weight connecting member 126 is a horizontal pivotable connection 134 between the free weight connecting member 126 and a free weight clamp 136 or the like.

The free weight clamp 136 serves to hold weights 130 in place with respect to the corresponding free weight connecting member 126. The horizontal pivotable nature of the

horizontal pivotable connection 134 allows the clamp 136 to be pivoted with respect to the free weight connecting member 126 and allow the weightlifter W to increase the distance between the dumbbells (weights) 130 and helps in placing and replacing weights on the dumbbell 130.

As can be seen by inspecting the Figures, the downward motion of the free weight connecting member 126 is obstructed and prevented by the horizontal supporting member 102. This means that the weightlifter W can rest the weights 130 on the horizontal supporting member 102 by causing the free weight connecting member 126 to rest on the horizontal supporting member 102.

Care must be taken to ensure that the vertical coupling member 110 does not flex too far forward and allow the free weight connecting member 126 to pivot past the horizontal supporting member 102. It is for this reason that stop 120 is set into place forward of the vertical coupling member 110 so that the weights 130 or the weightlifter W do not allow the vertical coupling member 110 to flex too far forward at its lower end 122. In an alternative embodiment of the invention, rear stops (not shown) similar to the front stops 120 may be made to prevent the rearward pivoting of the vertical coupling members 110 to ensure that the weights 130 do not fall or tilt too far backwards. The moment arm between the center 112 of the vertical coupling member 110 and the lower end 122 of the vertical coupling member 110 may be sufficiently short so that this acts effectively as a stop and prevents the excessive rearward travel of the weights 130.

As seen in Figure 1, cables 140 are attached to the vertical attachment member 106 and are strung over a pulley 142 to engage a counterweight 144. The counterweight 144 serves to compensate for the weight of the exercise device 100 of the present invention, and allows for

easier adjustment along the vertical support 146 that is present as a part of the exercise stand 148 that aids in supporting the exercise device 100.

Figure 1A shows a close-up of the encircled 1A portion shown in Figure 1. There, the vertical support 146 has apertures 150 through which a pin 152 fits. In order to avoid the pin 152, the counterweight 144 has a groove 154, which accommodates the working end 156 when the position of the counterweight 144 corresponds to the position of pin 152.

The pin 152 fits through a corresponding hole present in the vertical attachment member 106 so that the vertical attachment member 106 is securely coupled to and held by the vertical support 146. As shown in Figure 2, this allows for the vertical adjustment of the exercise device 100 of the present invention so that the height of the exercise device 100 particularly the horizontal supporting member 102 may be adjusted so that the weights 130 are spotted appropriately for the weightlifter W.

Figure 3 shows an alternative embodiment of the present invention where the rearward area 160 of the vertical attachment member 106 is open, such that the vertical attachment member 106 is open-ended. This then allows the attachment of the exercise device 100 via the vertical attachment 106 and vertical securement by a pin 152 or the like to a vertical support 162. Additionally, in an alternative embodiment, a latch or other mechanism may be used to ensure horizontal securement of the vertical attachment member 106 and the exercise device 100 to the vertical support 162 (shown in phantom).

Figure 4 shows additional weight posts 170 that allow the application of additional weights upon the free weight connecting member 126.

Figures 5 and 6 show the pivoting articulation of the free weight connecting members 126 with respect to the vertical coupling member 110, as well as the free weight clamps 136 with respect to the free weight connecting members 126.

In an alternative embodiment, Figure 7 shows the exercise device 100 of the present invention where a bar 180 coupled to weights 182 serves to provide a counterweight mechanism for the exercise device 100. The bar 180 is generally known in the art as a "lat bar" as it is used to exercise the latissimus dorsi muscles for weightlifters W. The lat bar 180 is connected by a cable 184 and over pulleys 186 to a weight 182. The counterweights 182 are adjustable as adjustable weights for the lat bar 180 and a hooking mechanism 190 serves to constructively engage the lat bar 180 such that the vertical adjustment of the vertical attachment member 106 is made easier.

As shown in Figure 8, the counterweight 182 provides for easier vertical adjustment of the exercise device 100.

In Figure 9, an alternative embodiment of the present invention is shown. The exercise device 100 is attached as by a vertical post 200, having a series of apertures 202 to a weight bench 204. The vertical post 200 is attachable as by a pin 152 to a similar aperture 206 in a receptacle 208 present at the head of the weight bench 204. The vertical attachment member 106 for the exercise device 100 may then be attachable as by a pin 152 to the vertical post 200.

Figure 10 shows one embodiment of the free weight clamp 136 that may constructively be used in conjunction with the present invention. A rear coupling 220 provides for horizontal pivoting with respect to the free weight connecting member 126 when a pin or other device is threaded through the holes or apertures 222 present in the rear coupling 220. The pin (not

shown) traveling through the holes 222 connects the clamp 136 to the free weight connecting member 126 and then serves as an axle about which the free weight clamp 136 may pivot.

The free weight clamp 136 generally has two forks 226 which are disposed in a generally upward direction so as to urge the barbell or dumbbell by gravity to the lower end 228 of the fork 226. A latch 230 is pivotably connected to the free weight clamp 136 adjacent the forks 226 in its rearmost end 232 by a pin, bolt or screw 234. Once the weight, barbell, or dumbbell has been inserted in the forks 226, a latch 230 then pivotably descends to prevent the bar (not shown) engaged by the forks 226 from exiting out the mouths of the forks 226. This holds the weight in place so that it is not inadvertently disengaged by the weightlifter W, as the range of travel for the latch 230 will not go beyond the top 240 of the fork 226. The downwardly extending latching portion 242 is able to maintain the bar in place despite movement of the bar inside the fork 226. Arrow 244 generally indicates the direction of motion of the latch 230.

In an alternative embodiment, free weight clamps 136 may be interconnected to act as a single operative member. This would then cause the weights 130 to act much in a similar manner as to a barbell, as both individual dumbbell elements would be connected. One means by which such an interconnection can be achieved is by attaching a pipe-like member between the two clamps 136. By connecting the clamps 136, the hands of the weightlifter W can then be positioned along the interconnecting member or along one or more of the grip areas naturally formed between the weights of one of the single dumbbells.

Figure 11 shows an alternative embodiment of the present invention, with the exercise device 100 being retrofittably adapted to a weightlifting bench system 250 having a set of parallel posts 252 coupled to the horizontal supporting member 102 in order to provide

spotting for the weightlifter W. The vertical post 252 may be hollow and vertically descending posts (not shown) attached to the horizontal supporting member 102 may descend into the vertical post 252. Pins or the like as described above could then be used to adjustably position the horizontal supporting member 102 with respect to the weight bench system 250 with its vertical posts 252. Additionally, a clamping mechanism or the like such as those which are known in the art (not shown) can serve to adjustably clamp the horizontal support member 102 to the vertical posts 252. Other means known in the art may also be used to provide adjustable attachment of either the horizontal supporting member 102 or the vertical attachment member 106 to the weight bench system 250 shown in Figure 11.

As shown in Figure 12, an alternative embodiment of the present invention allows for the elimination of the two rearwardly extending horizontal members 108 by separate vertical attachment posts 270, 272 to which the vertical coupling members 110 attach. The free weight connecting members 126 may then be individually supported by separate horizontal supporting members 274, 276. As in the other embodiments, outstanding flanges 104 serve to retain the free weight connecting members 126.

The individual horizontal supporting members 274, 276 may be adjustably supported by vertical posts 280, 282. Correspondingly, the right and left vertical posts 270, 272 may also be adjustable so that the weightlifter (not shown in Figure 12) can adjustably dispose the weights 130 at a preferred height. The remaining elements in the alternative embodiment shown in Figure 12 generally correspond to those in the other embodiments as shown in the drawings.

While the present invention has been described with regards to particular embodiments, it is recognized that additional variations of the present invention may be devised without



departing from the inventive concept. Among such variations are numerous configurations where the connecting arms 126 are supported by underlying supports while enjoying a pivoting or pivotable connection at the rear of such arms 126. Additionally, such variations may include designs dedicated to specific exercises such as shoulder presses, chest presses, and the  
5 like.

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